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Response of weeds and some characteristics of Red bean (Phaseolus calcaratus L.) to cultivation time and weeds control methods

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ABSTRACT: In order to evaluate the effects of time cultivation and weeds control methods on yield and some it components of Red bean (Phaseolus calcaratus L.) and select of best weeds control method a experiment was performed in farm of Ezna city. An experiment was carried out based on randomized complete block design in two separate tests with four replicates in 2012-2013. The experimental factors were time of cultivation at day and night also weeds control methods in six levels of control (without weed control), once hand weeding, application of Treflan herbicide, application of Bentazon herbicide, application of Treflan + once hand weeding and application of Bentazon + once hand weeding. Results showed that minimum number and dry weight of weeds (Lambsquarter, Puncturevine and Broomrape) obtained at night cultivation and application of Bentazon + once hand weeding (H+B) treatments. Red bean yield and some of it components was significantly higher in night cultivation and application of Bentazon + once hand weeding (H+B) treatments However, minimum weeds infestation and maximum yield and it components was obtained in both night cultivation and application of Bentazon + once hand weeding (H+B) treatment and this method is the best for controlling of weeds in Red bean.

Keywords: Bentazone, Red bean, Treflan, and Weeds control

INTRODUCTION

Red bean (Phaseolus calcaratus L.) is grown worldwide as a grain legume. Red bean is rich in protein and used in feeding, soap making, green vegetables and salad. This plant is very sensitive to weed competition. To avoid yield decrease, common bean crop should be kept weed-free 3 to 5 weeks after sowing (Dobrzański, 1996; Chmielowiec and Borowy, 1998). Weed management is a critical component of any farming system. (Liebman 1989 and Morrish, 1995; Cosser et al., 1996) suggested a number of biological, physiological and mechanical practices offering opportunities for (1) reducing a heavy reliance on agriculture herbicide and (2) for potentially improving farm profitability and environmental quality. Examples of such practices are weed-suppressive cover crops, soil fertility management, crop rotation and intercropping. Some weeds for example, Lambsquarter, Puncturevine and Broomrape are considered three of the most serious agricultural problem in Mediterranean countries and different parts of the world, causing sever damage to legume crops such as Red bean, peas, lentils, vetch, grass peas and chickpea (Mauromicale et al., 2000). (Orobanche spp.) is a parasite that attacks the roots of many dicotyledonous crops including legumes. It draws carbon, nutrients and water through haustoria, which connect the parasite with the host's vascular system. Broomrape infestation causes reductions in crop yield, adversely affecting crop quality and result in loss of cultivated land area (Nandula, 1998). Among the most affecting crops are legumes. Management of Broomrape is difficult because of its close association with the host.

Broomrapes are obligate holophrastic weeds that cause severe damage to the most important vegetable and field crops in Mediterranean region and the Middle East. Annual food crop losses due to broomrape infestation amount to $ 1.3 to 2.6 billion (Zehhar et al., 2004). Control of these parasites is difficult because broomrape produce hundred of thousand of minute seeds that are highly persistent to the soil conditions and can easily transfer to new areas. Methods of control included agricultural practices (such as hand weeding, tillage, crop rotation and sowing dates) and chemical control. Planting time is the major factor affecting development, source sink relationship and assimilation in faba bean plants. Some environmental problems that have been reported for herbicides, these compounds are still an important component of integrated weed management (Zimdahl, 1999). herbicides are essential inputs in agricultural systems of developed countries and a significant portion of crop yield is the consumption of these countries (Powel et al., 1997). in Iran so far, seven more herbicide (Trifluralin, Ethalfluralin, Bentazone, dactyl, Eradicane, Bazagran and Gallant) are registered for the beans (Zand et al., 2007). The lack of an effective way to control weeds during the entire growing season for the crop Red bean has led to the introduction of some herbicides.

Time of cultivation is crucial in many farming systems to avoid frost, drought, pests or diseases, which may occur early or late in the growing season. Suitable cultivation time may result in severe weed, insect and disease attack (Sahile et al., 2008;Mekky et al., 2003) referred that suitable time sowing in faba bean decreased broomrape infestation by 92%, in association with increasing seed yield by 27.7%. Most success in controlling weeds has been achieved with using herbicides. Application of herbicides two or three times at rate of 75 cm^3/fed gave 99.1 and 97.8% reduction of broomrape and increased seed yield by 149.5 and 141.5% as compared with the untreated plots in both of the seasons under investigation successively. (Messiha et al., 2004) reported that the post-emergence application of the low rate of herbicides substantially controlled broomrape parasitism in peas, by reducing the number, fresh and dry weight as compared with infected control.

Therefore, this study was planned to evaluate the effects of time cultivation and weeds control methods on control of some weeds and evaluate of some yield components in Red bean in Ezna, Iran environmental condition.

MATERIALS AND METHODS

In order to evaluation of effects of time cultivation(TC) and weeds control methods(CM) treatments on control of some weeds in Red bean (Phaseolus calcaratus L.) a field experiment was done in a farm of Ezna city, Iran, during the growing season of 2012–2013. This site is located at 33°27' N latitude, 49°27' E longitude, at an altitude of 1780 m above sea level in Lorestan provience. The Sayad Red bean cultivar was supply from Jihad of Ezna city and growing type of it was indeterminate. Soil of field was loam (pH= 7.7) with organic matter content 0.57% , total P 8ppm, K 220ppm, N 0.04%, C 0.57%, Fe 5.2ppm, Mn 4ppm, Cu 0.68ppm and Zn 0.32ppm. The experiment was a randomized complete block design with four replications. The experimental factors were time cultivation at day and night, weeds control methods in six levels of (1)control (without weed control), (2)once hand weeding (H), (3)application of Treflan herbicide(T), (4)application of Bentazon herbicide(B), (5)application of Treflan + once hand weeding (H+T) and (6)application of Bentazon + once hand weeding (H+B). Sayad Red bean cultivar was planted in a 6m long, 4-row plot. Row to row and plant - plant distance was maintained at 50cm and, 5cm respectively. Seeds were placed at 3 to 5 cm depth in each row. Weeds sampling were done at 35 and 60 days after sowing. In each plot total weeds in $1m^2$ were harvested, then individuation them in different families and species. Then dry matter of weeds was determined. In maturity stage Red bean plant samples were taken with 15 plants from each plot and dry weight of pod, pod length and seed weight per pod determined. To determine of grain yield and pod harvest index plants were harvested from the middle of each plot. Then grain yield recorded on a dry weight basis. Yield was defined in terms of grams per square meter and quintals per hectare. The pod harvest index was calculated by the following equation:

HI = (Economical yield / Biological yield of pods (seeds +pods weight))□100

The data were subjected to analysis of variance using SAS(SAS Institute Inc., 2002). Means were compared using Duncan's Multiple Range test at P≤0.05. Treatment effects from the two runs of experiments followed a similar trend, and thus the data from the two independent runs were combined in the analysis.

RESULTS AND DISCUSSION

Lambsquarter

The effect of all treatments on number and dry weight of Lambsquarter was significant (Table 1). The mean comparisons of the number of Lambsquarter showed that day cultivation treatment has the highest (4.5 p/m^2) number of Lambsquarter and night cultivation treatment has the lowest number of Lambsquarter (2.31 p/m^2) and the differences were significant (Table 2). Among the weeds control methods treatments, the lowest number of Lambsquarter (0.71 p/m^2) was belonged at application of Bentazon + once hand weeding (H+B)treatment and the highest number of Lambsquarter (9.5 p/m^2) was belonged at control treatment (Table 2). For interaction between time of cultivation□weeds control methods (Table 3) shows that TC_1CM_1 treatment has the highest (12.75 p/m^2) number of Lambsquarter and the TC_2CM_5 treatment has the lowest number of Lambsquarter (0.55 p/m^2) and the differences were significant. The mean comparisons of the Lambsquarter dry weight showed that day cultivation treatment has the highest (5 g/m^2) Lambsquarter dry weight and night cultivation treatment has the lowest Lambsquarter dry weight (2.82 g/m^2) and the differences were significant (Table 2). Among the weeds control methods treatments, the lowest Lambsquarter dry weight (0.56 g/m^2) was belonged at application of Bentazon + once hand weeding (H+B)treatment and the highest Lambsquarter dry weight (11.41 g/m^2) was belonged at control treatment (Table 2). For interaction between time of cultivation□weeds control methods (Table 3) shows that TC_1CM_1 treatment has the highest (14.24 g/m^2) Lambsquarter dry weight and the TC_2CM_5 treatment has the lowest Lambsquarter dry weight (0.29 g/m^2) and the differences were significant. Similar results were reported by (Mekky et al., 2003).

Table 1. Analysis of variance (mean squares) for effects of time of cultivation and weeds control methods on dry weight and number of different weeds in Red bean farm

source	df	Lambsquarter		Puncturevine		Broomrape	
source	df	Dry weight	Number	Dry weight	Number	Dry weight	Number
R							
Time(T)	1	57.181**	57.531**	109.958**	54.187**	7.130**	4.896**
Ea	3	0.830	0.253	0.476	0.743	0.021	0.027
Controle method(C)	5	126.943**	79.167**	1743.224**	1002.570**	8.783**	8.298**
T*C	5	9.395**	10.080**	15.505**	4.637*	3.861**	4.698**
Eb	30	0.639	0.322	2.399	2.070	0.017	0.027
CV		20.42	16.67	9.56	10.35	19.23	29.30

* and **: Significant at 5% and 1% probability levels, respectively

Puncturevine

The effect of all treatments on number and dry weight of Puncturevine was significant (Table 1). The mean comparisons of the number of Puncturevine showed that day cultivation treatment has the highest (14.95 p/m^2) number of Puncturevine and night cultivation treatment has the lowest number of Puncturevine (12.83 p/m^2) and the differences were significant (Table 2). Among the weeds control methods treatments, the lowest number of Puncturevine (1.75 p/m^2) was belonged at application of Bentazon + once hand weeding (H+B)treatment and the highest number of Puncturevine (31.5 p/m^2) was belonged at control treatment (Table 2). For interaction between time of cultivation□weeds control methods (Table 3) shows that TC_1CM_1 treatment has the highest (32.75 p/m^2) number of Puncturevine and the TC_2CM_6 treatment has the lowest number of Puncturevine (0.0 p/m^2) and the differences were significant. The mean comparisons of the Puncturevine dry weight showed that day cultivation treatment has the highest (17.70 g/m^2) Puncturevine dry weight and night cultivation treatment has the lowest Puncturevine dry weight (14.68 g/m^2) and the differences were significant (Table 2). Among the weeds control methods treatments, the lowest Puncturevine dry weight (1.95 g/m^2) was belonged at application of Treflan + once hand weeding (H+B) treatment and the highest Puncturevine dry weight (42.53 g/m^2) was belonged at control treatment (Table 2). For interaction between time of cultivation□weeds control methods (Table 3) shows that

TC_1CM_1 treatment has the highest (43.88 g/m^2) Puncturevine dry weight and the TC_2CM_6 treatment has the lowest Puncturevine dry weight (0.0 g/m^2) and the differences were significant. Similar results were reported by (Mekky et al., 2003).

Broomrape

The effect of all treatments on number and dry weight of Broomrape was significant (Table 1). The mean comparisons of the number of Broomrape showed that day cultivation treatment has the highest (0.88 p/m^2) number of Broomrape and night cultivation treatment has the lowest number of Broomrape (0.25 p/m^2) and the differences were significant (Table 2). Among the weeds control methods treatments, the lowest number of Broomrape (0.0 p/m^2) was belonged at application of Bentazon + once hand weeding (H+B) and Treflan + once hand weeding (T+B) treatments and the highest number of Broomrape (2.62 p/m^2) was belonged at control treatment (Table 2). For interaction between time of cultivation□weeds control methods (Table 3) shows that TC_1CM_1 treatment has the highest (4.5 p/m^2) number of Broomrape and the TC_2CM_5 and TC_2CM_6 treatments has the lowest number of Broomrape (0.0 p/m^2) and the differences were significant. The mean comparisons of the Broomrape dry weight showed that day cultivation treatment has the highest (1.08 g/m^2) Broomrape dry weight and night cultivation treatment has the lowest Broomrape dry weight (0.31 g/m^2) and the differences were significant (Table 2). Among the weeds control methods treatments, the lowest Broomrape dry weight (0.0 g/m^2) was belonged at application of Bentazon + once hand weeding (H+B) and Treflan + once hand weeding (T+B) treatments and the highest Broomrape dry weight (2.74 g/m^2) was belonged at control treatment (Table 2). For interaction between time of cultivation□weeds control methods (Table 3) shows that TC_1CM_1 treatment has the highest (4.53 g/m^2) Broomrape dry weight and the TC_2CM_5 and TC_2CM_6 treatments has the lowest Broomrape dry weight (0.0 g/m^2) and the differences were significant. Similar results were reported by (EL-Metwally, 2013).

Table 2. Mean comparisons for effects of time cultivation and weeds control methods on dry weight and number of different weeds in Red bean farm

traitments	Lambsquarter		Puncturevine		Broomrape	
	Dry weight (g/m^2)	Number (p/m^2)	Dry weight (g/m^2)	Number (p/m^2)	Dry weight (g/m^2)	Number (p/m^2)
time						
day	5.00^a	4.50^a	17.70^a	14.95^a	1.08^a	0.88^a
night	2.82^b	2.31^b	14.68^b	12.83^b	0.31^b	0.25^b
Control method						
control	11.41^a	9.50^a	42.53^a	31.50^a	2.74^a	2.62^a
Once handing control (H)	3.54^c	3.62^b	13.89^c	14.25^c	0.15^c	0.12^{cd}
Treflan(T)	4.78^b	2.75^c	18.37^b	18.62^b	0.70^b	0.37^b
Bentazon(B)	1.91^d	2.25^c	17.66^b	15.37^c	0.57^b	0.29^{bc}
H+T	1.26^{de}	1.58^d	1.97^d	1.87^d	0.00^d	0.00^d
H+B	0.56^e	0.71^e	2.73^d	1.75^d	0.00^d	0.00^d

Means followed by the same letters in each column are statistically not significant different (Duncan's multiple range test, $p \leq 0.05$)

Red bean treats

Plant height

The effect of control method treatment on plant height was significant and the other treatments were not significant on it (Table 1). The mean comparison of the plant height showed that, the highest plant height (80.93 cm) was belonged at application of Bentazon + once hand weeding (H+B) treatment and the lowest plant height (58.12 cm) was belonged at control treatment (Table 2). Similar results were reported by (Abu-Hamdeh, 2003; Chmielowiec and Borowy, 2004) in bean.

Table 3. Interaction effect of all treats on dry weight and number of different weeds in Red bean farm

traitments	Lambsquarter		Puncturevine		Broomrape	
	Dry weight (g/m^2)	Number (p/m^2)	Dry weight (g/m^2)	Number (p/m^2)	Dry weight (g/m^2)	Number (p/m^2)
TC_1 CM_1	14.24^{a}	12.75^{a}	43.88^{a}	32.75^{a}	4.53^{a}	4.50^{a}
TC_1 CM_2	3.84^{d}	4.50^{c}	17.20^{c}	15.75^{d}	0.30^{d}	0.25^{cd}
TC_1 CM_3	6.74^{c}	3.75^{c}	18.60^{c}	18.50^{c}	1.00^{b}	0.025^{cd}
TC_1 CM_4	2.12^{ef}	2.50^{de}	17.37^{c}	15.75^{d}	0.65^{c}	0.33^{c}
TC_1 CM_5	2.24^{ef}	2.62^{de}	3.72^{e}	3.50^{f}	0.00^{e}	0.00^{d}
TC_1 CM_6	0.83^{gh}	0.87^{f}	5.46^{e}	3.50^{f}	0.00^{e}	0.00^{d}
TC_2 CM_1	8.58^{b}	6.25^{b}	41.19^{b}	30.25^{b}	0.96^{b}	0.75^{b}
TC_2 CM_2	3.24^{de}	2.75^{d}	10.57^{d}	12.75^{e}	0.00^{e}	0.00^{d}
TC_2 CM_3	2.82^{de}	1.75^{e}	18.14^{c}	18.75^{c}	0.40^{d}	0.50^{c}
TC_2 CM_4	1.69^{fg}	2.00^{de}	17.95^{c}	15.00^{d}	0.50^{cd}	0.25^{cd}
TC_2 CM_5	0.29^{h}	0.55^{f}	0.23^{f}	0.25^{g}	0.00^{e}	0.00^{d}
TC_2 CM_6	0.30^{h}	0.56^{f}	0.00^{f}	0.00^{g}	0.00^{e}	0.00^{d}

Means followed by the same letters in each column are statistically not significant different (Duncan's multiple range test, $p \leq 0.05$). (TC=time of cultivation(1=day and 2= night), CM=control method, (1)=control (without weed control), (2)=once hand weeding (H), (3)=application of Treflan herbicide(T), (4)=application of Bentazon herbicide(B), (5)=application of Treflan + once hand weeding (H+T) and (6)=application of Bentazon + hand weeding (H+B)).

Number of branch per plant

The effect of cultivation time and control method treatments on number of branches per plant were significant, but the effect of interaction between them on it was not significant (Table 1). The mean comparisons values of the number of branches per plant showed that night cultivation treatment has the highest (3.85) number of branches per plant and day treatment has the lowest number of branches per plant (3.14) and the differences were significant (Table 2). Among the weeds control methods treatments, the highest number of branches per plant (4.42) was observed from application of Bentazon + once hand weeding (H+B)treatment and the lowest number of branches per plant (2.40) was belonged to control treatment (Table 2) and the differences were significant.
Similar results were reported by (Abu-Hamdeh, 2003; Chmielowiec and Borowy ,2004) in bean.

Table 4. Analysis of variance (mean squares) for effects of time of cultivation and weeds control methods on some yield components of Red bean

source	df	Plant height	Number of branch per plant	Number of pod per plant	Pod length	Pod dry weight	Grain yield
R							
Time(T)	1	365.093^{ns}	5.922^{*}	83.529^{*}	0.336^{ns}	83.925^{*}	373041.99^{**}
Ea	3	320.763	0.406	3.341	0.862	7.471	11522.05
Controle method(C)	5	565.512^{**}	3.595^{**}	234.860^{**}	0.329^{ns}	720.114^{**}	5016177.74^{**}
T*C	5	50.148^{ns}	0.1189^{ns}	4.821^{ns}	2.509^{ns}	2.349^{ns}	22127.71^{ns}
Eb	30	62.053	0.456	3.459	0.278	8.386	20855.08
CV		11.58	19.31	8.01	4.76	9.47	5.30

* and **: Significant at 5% and 1% probability levels, respectively

Nuumber of pod per plant

The effect of all treatments on number of pod per plant was significant excluding interaction between them (Table 4). The comparison of the mean values of the number of pod per plant showed that night cultivation treatment has the highest (24.51) number of pod per plant and day treatment has the lowest number of pod per plant (21.87) and the differences were significant (Table 5). Among the weeds control methods treatments, the highest number of pod per plant (28.89) was belonged at application of Bentazon + once hand weeding control(H+B)treatment and the lowest number of pod per plant (13.08) was belonged at control treatment (Table 2). For interaction between time of cultivation×weeds control methods (Table 6) shows that TC_2CM_6 treatment has the highest (30.06) number of pod per plant and the TC_1CM_1 treatment has the lowest number of pod per plant (12.86) and the differences were significant. Similar results were reported by (Abu-Hamdeh, 2003; Chmielowiec and Borowy, 2004 ; Aleksandra Głowacka, 2010) in bean.

Pod length

The effect of any treatments on pod length were not significant (Table 1). Similar results were reported by (Abu-Hamdeh, 2003; Chmielowiec and Borowy, 2004) in bean.

Table 5. Mean comparisons for effects of time cultivation and weeds control methods on some yield components of Red bean

traitments	Plant height (cm)	Number of branch per plant	Number of pod per plant	Pod length (cm)	Pod dry weight (g)	Grain yield (kg/ha)
time						
day	70.77^{a}	3.14^{b}	21.87^{b}	10.97^{a}	29.25^{b}	2633.17^{b}
night	65.25^{a}	3.85^{a}	24.51^{a}	11.14^{a}	31.90^{a}	2809.48^{a}
Control method						
control	58.12^{d}	2.40^{c}	13.08^{e}	11.09^{a}	15.06^{e}	1274.72^{e}
Once handing control (H)	61.47^{cd}	3.56^{b}	23.82^{cd}	11.16^{a}	28.01^{d}	2626.29^{d}
Treflan(T)	67.27^{cb}	3.86^{ab}	25.18^{bc}	11.00^{a}	28.39^{cd}	2690.48^{d}
Bentazon(B)	74.40^{ab}	3.41^{b}	25.83^{b}	10.95^{a}	38.45^{b}	2915.76^{c}
H+T	65.88^{cd}	3.32^{b}	22.36^{d}	11.00^{a}	31.32^{c}	3260.12^{b}
H+B	80.93^{a}	4.42^{a}	28.89^{a}	11.16^{a}	42.22^{a}	3560.59^{a}

Means followed by the same letters in each column are statistically not significant different (Duncan's multiple range test, $p \le 0.05$)

Pod dry weight

The effect of cultivation time and control method treatments on pod dry weight were significant, but the effect of interaction between them on it was not significant (Table 1). The mean comparisons of the pod dry weight showed that night cultivation treatment has the highest (31.9 g) pod dry weight and day treatment has the lowest pod dry weight (21.25 g) and the differences were significant (Table 2). Among the weeds control methods treatments, the highest pod dry weight (42.22 g) was belonged to application of Bentazon + once hand weeding (H+B)treatment and the lowest pod dry weight (15.06 g) was belonged to control treatment (Table 2). Similar results were reported by (Abu-Hamdeh, 2003; Chmielowiec and Borowy, 2004) in bean.

Grain yield

The effect of time of cultivation and control method treatments on grain yield were significant, but the effect of interaction between them on grain yield was not significant (Table 4). The mean comparisons values of the grain yield showed that night cultivation treatment has the highest (2809.48kg/ha) grain yield and day treatment has the lowest grain yield (2633.17kg/ha) and the differences were significant (Table 5). Among the weeds control methods treatments, the highest grain yield (3560.59kg/ha) was belonged at application of Bentazon + once handing weeds control(H+B)treatment and the lowest grain yield (1274.72kg/ha) was belonged to control treatment (Table 5). For interaction between time of cultivation□weeds control methods (Table 6) shows that TC_2CM_6 treatment has the highest (3606kg/ha) grain yield and the TC_1CM_1 treatment has the lowest grain yield (1193.5kg/ha) and the differences were significant. Similar results were reported by (Abu-Hamdeh, 2003; Chmielowiec and Borowy, 2004 ; Aleksandra Głowacka, 2010) in bean.

Table 6. Interaction effect of all treats on some yield components of Red bean

traitments	Plant height (cm)	Number of branch per plant	Number of pod per plant	Pod length (cm)	Pod dry weight (g)	Grain yield (kg/ha)
TC_1 CM_1	59/76c	2/26e	12.81^{f}	10/69a	14/45e	1193/5^{g}
TC_1 CM_2	65/61bc	3/21c-e	21/84de	11/01a	27/02d	2436/4^{f}
TC_1 CM_3	74/36ab	3/34b-e	24/36^{cd}	10/99a	26/89d	2612/0^{ef}
TC_1 CM_4	75/79ab	3/06c-e	23/42^{c-e}	10/79a	36/25b	2866/3^{d}
TC_1 CM_5	68/09bc	2/93de	21/08^{e}	11/36a	30/15cd	3175/7^{c}
TC_1 CM_6	80/99a	4/06a-c	27/73^{ab}	11/01a	40/75a	3515/2^{ab}
TC_2 CM_1	56/48c	2/53e	13/34^{f}	11/49a	15/67e	1355/0^{g}
TC_2 CM_2	57/33c	3/91a-d	25/79^{bc}	11/31a	29/00cd	2816/2de
TC_2 CM_3	60/18c	4/37ab	25/99^{bc}	10/64a	29/89cd	27/69/0de
TC_2 CM_4	73/01ab	3/76a-d	28/24^{ab}	11/10a	40/65a	2965/2^{d}
TC_2 CM_5	63/66bc	3/71a-d	23/64^{c-e}	1064a	32/48bc	3344/6^{bc}
TC_2 CM_6	80/86a	4/79a	30/06^{a}	11/31a	43/68a	3606/0^{a}

Means followed by the same letters in each column are statistically not significant different (Duncan's multiple range test, p≤0.05). (TC=time of cultivation(1=day and 2= night), CM=control method, (1)=control (without weed control), (2)=once hand weeding (H),(3)=application of Treflan herbicide(T),(4)=application of Bentazon herbicide(B), (5)=application of Treflan + once hand weeding (H+T) and (6)=application of Bentazon + hand weeding (H+B)).

It is clear from the same table that the treatments which had low Orobanche infestation and other weeds had good growth patterns and hence showed high grain yield. This study revealed that the chemical control of weeds in Red bean can be achieved by using the herbicide Treflan and Bentazon. These treatments with hand weeding treatment were adequately enough to govern the number of broomrape, Lambsquarter and Puncturevine in Red bean fields. Similar findings were reported by (Mekky et al., 2003; Ghalwash et al., 2008 and Bellido et al., 2009). The most effective was the mechanical-chemical method, which significantly reduced both the number of weeds and their dry weight. This method is gaining in importance due to the promotion of integrated agriculture and efforts to restrict the use of chemicals (Podleśny, 2007). This trend diminished over time, and in day cultivation, the total number of weeds in the day treatments had caught up to those in the night treatments. However, in day cultivation treatment there were significantly more large weeds in the day treatment than the night treatment, which supports the inference that there were early differences between the night and day treatments, at least for the cultivated plots. Slight reduction in weeds may be possible by cultivating at night, though weed numbers would still necessitate post-emergence control measures. This study revealed that the chemical control of weeds on Red bean can be achieved by using the herbicide Bentazon and Treflan. Chemical treatments were adequately enough to govern the number of weeds emerging in Red bean fields, but application of herbicides with handing weeds control has a better effects on weeds control on this fields. (EL-Metwally, 2013) indicated that the number and dry weight of broomrape were significantly affected by the different time of sowing. Spraying herbicide was very effective in controlling broomrape (EL-Metwally, 2013). (EL-Metwally, 2013) showed that, a decrease in number and dry weight of broomrape spikes was recorded as compared with unweedy control plots. They reported that reduction percentage of broomrape dry weight by herbicide application. These results may be due to the stimulant is secreted by the roots at a certain stage of development of the host, exactly the stage just before or during flowering causing broomrape germination and attachment to the host. The above results are in agreement with those of (Mekky et al., 2003;Ghalwash et al., 2008 and Ghannam et al., 2012). In this respect, (Fayed et al., 2002) reported that there is a strong negative correlation between faba bean seed yield and the number of Orobanche infestation/m^2.

Red bean and its attributes were significantly affected by the different time of cultivation and weeds control methods. The best results recorded for the different characters (including the plant height, number of branches per plant, number of pod per plant, pod length, pod dry weight and grain yield) were for cultivation at night. This verifies that Bentazon herbicide is more effective when applied at early growth stages that weeds are more sensitive. (Motley et al., 2004) also concluded that growth stage greatly affects the efficiency of herbicide.(Minotti and Sweet, 1981) reported that application of a suitable herbicide at the early growth stages controls weeds efficiently and makes crop the winner of competition. Red bean yield was significantly higher in night cultivation condition. Analysis of data revealed that cultivation time and weeds control treatment interaction significantly affected seed yield kg/ha. Maximum seed yield was obtained with cultivation at night with the application of Bentazon + once handing weeds control(H+B)treatment. This explains the integrated role of both cultivation time of Red bean and Bentazone herbicides in weeds control. The integration approach for weeds control of Red bean was mentioned by (Mekky et al., 2003 and Ghalwash et al., 2008). The quality of the seedbed produced by differing soil disturbance intensities may influence the germination and establishment of weeds in night and day tillage experiments. Weeds germination responses to the light environment in the field were far more variable than what would be predicted from laboratory experiments investigating light induced germination (Gallagher, 1996). In most treatments maximum grain yield and yield components achieved in application of Bentazon + once handing weeds control (H+B) treatment. Alone chemical or handing weed control methods were less effective in reducing the number of weeds per unit area instead of both chemical and handing weed control methods.

CONCLUSION

Applicaton of herbicides, specific Bentazon had a significant affect in weeds control. In the present study, the highest weed infestation was found to result when any weeds control methods were not used for weed control. This explains the integrated role of both cultivation at dark condition and application of Bentazon + once handing weeds control (H+B) treatment method in Red bean. However, these results showed that application of Bentazon with once handing weeds control method was very effective in controlling of weeds, which lead to maximum yield and yield components in Red bean.

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